Making fuels and vegetation data available for fire management

By David Pillmore and Pat Stephen

HOW WILL A FIRE BURN given particular conditions such as wind speed, slope, and humidity? Fire technicians can readily and accurately measure these parameters for input into a model, but two other variables, fuels and vegetation, require a concerted mapping effort and management of data for easy access. In 2003, data managers and fire technicians in the NPS Natural Resource Information Division, Rocky Mountain National Park, and Grand Teton National Park joined forces to design a tool for capturing and transferring information on fuels and vegetation that makes these data readily available for fire management. Their approach is promising and adaptable far beyond high-elevation mountain parks.

The need for such a tool emerged during the development of models for managing fire risk. The vegetation map that fire managers in Rocky Mountain National Park were using as a basis for developing their models was created in 1988 using methods that are outdated by today's standards. Although managers estimated its accuracy at 80% to 85%, the fuel parameters assigned to the various vegetation associations had never been tested in the field.

The efforts behind the prototype fuels-vegetation mapping project involved gathering field and remotely sensed data from 547 plots, which are representative of larger biophysical units that combine vegetation and geographic attributes. Notably, field crews simultaneously recorded fuels and vegetation data, streamlining the mapping process. Field documentation also included numerous photographs from each plot. Aerial photo interpretation, map development, and field testing for accuracy are ongoing.

"The design is flexible.... [and] provides a means for easily exporting data to fire and fuels management applications"

The backbone of the prototype fuels-vegetation mapping project is the management of data through the fuels-vegetation mapping application. Starting with the NPS standard database, Microsoft Access, the application is well designed using standard data models and formatting. Project designers incorporated models such as the Anderson Guide fuel models and Burgan and Rothermel fuel inventories into the database. They followed a standard structure and template, developed by the Inventory and Monitoring Program, to be used for all resource-related studies and created a layout that is compatible with data entry forms used by vegetation mapping crews, which facilitated both data entry and quality control. The application makes plot information and more than 3,000 plot-related photos available for review digitally. A linkage allows the photos to be viewed by querying the plot from within the GIS, enhancing the ability to compare map layers with photographs of the surrounding terrain.

Along Bear Lake Road in Glacier Gorge, Rocky Mountain National Park, field crews inventoried plot #406, simultaneously mapping fuel types and cover with vegetation for input into fire-fuel models. Among the 16 species identified are the conspicuous quaking aspen (*Populus tremuloides*) and eagle fern (*Pteridium aquilinum*).

The design is flexible. For example, repeat visits to build time-series data, for tracking changes over time, can be included and different habitats can be incorporated. The design also provides a means for easily exporting data to fire and fuels management applications like Fuels Management Analyst (FMA) and Forest Vegetation Simulator (FVS). In short, the prototype fuels-vegetation mapping application is a tool for capturing information on fuels and vegetation that can be used for developing better models and testing assumptions about forest growth, fire behavior, and fire-risk analysis.

Managers in Rocky Mountain and Grand Teton National Parks developed similar prototypes in 2003. Many reasons exist for other fire and network data managers with vegetation mapping projects to adopt these prototypes for use in their parks: the application is public domain, the design and database structure are established, the code is written, the links for exporting information into other programs are set, and the electronic forms are in place. Saving time and money, of course, is another factor. In addition, the potential for sharing data through the same data structure and the ease of communication about a similar database make the prototype fuels-vegetation mapping application a powerful starting point for collaboration. ■

david_pillmore@nps.gov
Computer Technician, Rocky Mountain Network; Estes Park, Colorado

pat_stephen@nps.gov
Prescribed Fire Technician, Rocky Mountain National Park, Colorado